Examining Fatal Opioid Overdoses in Marion County, Indiana
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**ABSTRACT**
Drug-related overdoses are now the leading injury-related death in the USA, and many of these deaths are associated with illicit opioids and prescription opiate pain medication. This study uses multiple sources of data to examine accidental opioid overdoses across 6 years, 2010 through 2015, in Marion County, IN, an urban jurisdiction in the USA. The primary sources of data are toxicology reports from the county coroner, which reveal that during this period, the most commonly detected opioid substance was heroin. During the study period, 918 deaths involved opioids, and there were significant increases in accidental overdose deaths involving both heroin and fentanyl. In order to disentangle the nature and source of opioid overdose deaths, we also examine data from Indiana's prescription drug monitoring program and the law enforcement forensic services agency. Results suggest that there have been decreases in the number of opiate prescriptions dispensed and increases in law enforcement detection of both heroin and fentanyl. Consistent with recent literature, we suggest that increased regulation of prescription opiates reduced the likelihood of overdoses from these substances, but might have also had an iatrogenic effect of increasing deaths from heroin and fentanyl. We discuss several policy implications and recommendations for Indiana.

## INTRODUCTION

Drug-related overdoses in 2014 were higher than any previous year on record and are now the leading injury-related death in the United States.[1] Many drug overdose deaths are associated with opioids,[1] a drug category encompassing both illicit heroin and prescription opiate pain relievers. A 2016 report from the Centers for Disease Control (CDC) finds that, since 2000, there has been a 137% increase in drug overdose deaths with a 200% increase in drug overdose deaths involving opioids.[1]

Opioid addiction has become a national health epidemic in the United States, with serious social and economic implications. Indiana is no exception, as the percentage of hospital treatment episodes in Indiana for opioid use has more than doubled since 2000; in 2013, Indiana's rate of overdose fatalities, 14.4 per 100,000 citizens, ranked 17th nationally (Indiana ranks 16 for population).[2] Previous research tracked the dramatic increase in accidental overdose deaths in Indiana and the United States.[3, 4] However, because the Indiana State Department of Health (ISDH) mortality files on drug-related deaths rely on ICD-10 (International Classification of Diseases, 10th Revision) codes, it is not possible to obtain detailed information on the specific opioid substances related to the fatality, a shortcoming that has been noted in academic literature.[5-9] Therefore, given the nature of statewide data, we are unable to extricate which opioid substances are most commonly related to fatal overdoses.

Given this shortcoming in available data, we developed a collaboration with the Marion County, Indiana coroner's office (MCCO) and followed earlier research designs[10-15] to capture toxicology data on all opioid-related overdoses in Marion County, Indiana from 2010 through 2015. Then, using data from the Indiana Scheduled Prescription Electronic Collection and Tracking Program (INSPECT) and the Marion County Forensic Services Agency's (MCFSA) screening of drug evidence, we examine whether opioid-related overdose trends are driven by changes in synthetic opioid prescriptions or illicit drug markets. Drawing from these multiple datasets allowed us to better disentangle the nature and source of opioid overdose and provide policy recommendations.

## METHODS

*Study Population*. This study focuses on Marion County, Indiana from 2010 through 2015. Marion County is the largest county in the state, and its county seat, Indianapolis, is the state capital. In 2015 the population was estimated at 939,020 and was 57.3% White, 28.0% Black, 10.0% Hispanic or Latino, and 4.7% other race/ethnicity.[16]

## Data Sources and Classifications

The primary source of data examined in this study comes from the MCCO, which has jurisdiction over cases where the decedent has died as a result of casualty or violence; has died in a suspicious, unusual, or unnatural manner; or has died in apparent good health or been found dead.[17, 18] As drug overdose fatalities meet these criteria, they are within the jurisdiction of the MCCO. The MCCO provided us with 1,256 case numbers of persons established to have died of an accidental drug overdose in Marion County, Indiana between January 1, 2010 and December 31, 2015. From this list, a team of researchers were able to collect death certificates and

[1] In this paper we use "opioid" to refer to the entire family of natural, synthetic, and semi-synthetic opiates, but use "opiate" to refer to synthetic prescription opiates.

toxicology reports for 1,199 (95.5%) of the cases.[2] A careful review of these 1,199 cases found 918 cases (76.6%) involving an opioid. Death certificates were used to capture sociodemographic variables such as age, race/ethnicity, gender, and marital status. For each case we also reviewed the toxicology report to determine whether an opioid was present in the decedent's system. We recorded the presence of several opioids: 6-monoacetylmorphine (heroin), morphine, codeine, oxycodone, hydrocodone, oxymorphone, hydromorphone, and fentanyl. One of the limitations of using toxicology data to measure the presence of opioids is the potential for inaccurately measuring the presence of morphine and codeine. Guidelines from laboratory toxicologists suggest that 6-monoacetylmorphine is the definitive test for illicit heroin.[19] However, heroin undergoes a rapid metabolic transformation into natural opioids of morphine or codeine and so heroin-related toxicology reports sometimes show signs of morphine and codeine but not 6-monoacetylmorphine. Therefore, following previous research,[20] we coded cases that had both morphine *and* codeine, but not 6-monoacetylmorphine, as heroin cases. As a result of this we did not double count morphine and codeine again in these cases as doing so would over-represent the frequency of these substances in the population. Throughout the data collection process, two independent reviewers coded information, and a senior reviewer conducted random checks for accuracy in coding.

As the source for these various opioids could stem from licit or illicit sources, we also analyzed opiate prescription drug trends and drug crime lab analysis trends. We gathered data on prescription drug patterns from the Indiana Scheduled Prescription Electronic Collection and Tracking Program (INSPECT). Prescription drug monitoring programs are designed to reduce the abuse of prescription drugs by providing law enforcement with a tool to detect and investigate illegal activities.[21] Since 2004, INSPECT requires that all licensed pharmacies report the prescription and dispensation of all Schedule II through Schedule IV drugs. Therefore, in theory all prescription opiates distributed via licensed pharmacies are reported.

Finally, to capture changes in illicit drug markets and the availability of illicit drugs, we gathered data from the records of the Marion County Forensic Services Agency (MCFSA) which performs both presumptive and confirmatory analysis of substances seized by the Indianapolis Metropolitan Police Department (IMPD) that are suspected of containing illicit substances. MCFSA performs these analyses when the case involving the substances is brought to trial; the weight of a suspected illicit substance meets or falls just under a weight specified by state law; and when IMPD officers tasked with performing presumptive testing encounter problems when testing and/or are uncomfortable with testing the substance. While these data do not provide a full picture of all arrests made for possession and/or distribution of illicit opioids over this time period, they offer a proxy measure for changes in illicit drug use patterns.

**Analytic Plan**

Research suggests that high rates of opioid abuse are driven by the prescribing rates of these substances;[21-23] therefore, the hypothesis of this study is to asses whether changes in prescription opiates are associated with trends in opioid-related deaths and illicit drug detections. Unfortunately, we are only able to examine aggregate level data, by substance and year, on prescriptions and forensic detection. Therefore, our analytic approach is limited to examining counts and annual rates of change for each substance across all three data sources.

[2] Missing data were largely due to what the MCCO referred to as a "green sheet": cases where the decedent died in a hospital and the coroner's office was not contacted, but instead the decedent went directly to the funeral home.

## RESULTS

### Coroner's Data

From 2010 through 2015, we identified 1,199 accidental drug overdose fatalities for which we were able to locate death certificates and toxicology reports; of these, 918 cases contained an opioid (i.e., 6-monoacetylmorphine, morphine, codeine, oxycodone, hydrocodone, oxymorphone, hydromorphone, or fentanyl). Table 1 displays the sociodemographic characteristics for the opioid-related overdoses in our study. The average age was 39.3 years old. There was one case of a three-year old child and two four-year children dying from an opioid and so the age ranged from 3 to 76 years old. The age category with the highest rate of deaths was 30-39 years old at 26.6%, followed by 19-29 years old at 25.4%. Table 1 also shows that fatalities with an opioid present were likely to be male (66.7%), White (85.3%), and never married (44.8%) which is disproportionate to Marion County demographics of 49.2% male, 57.3% White, and 39.6% married.[21]

**Table 1. Sociodemographic Characteristics of Opioid-Related Deaths in Marion County, Indiana, 2010-2015**

| | M (Range) |
|---|---|
| Age | 39.3 (3-76) |
| | |
| Age Categories | N (%) |
| 18 and Under | 14 (1.5%) |
| 19-29 | 233 (25.4%) |
| 30-39 | 244 (26.6%) |
| 40-49 | 197 (21.5%) |
| 50-59 | 180 (19.6%) |
| 60-69 | 48 (5.2%) |
| 70-79 | 2 (0.2%) |
| | |
| Sex | |
| Male | 612 (66.7%) |
| Female | 306 (33.3%) |
| | |
| Race/Ethnicity | |
| Black | 115 (12.5%) |
| White | 783 (85.3%) |
| Hispanic | 10 (1.1%) |
| Other | 10 (1.1%) |
| | |
| Marital Status | |
| Never Married | 411 (44.8%) |
| Married | 169 (18.4%) |
| Divorced | 211 (23.0%) |
| Widowed | 14 (1.5%) |
| Unknown | 113 (12.3%) |

N=918

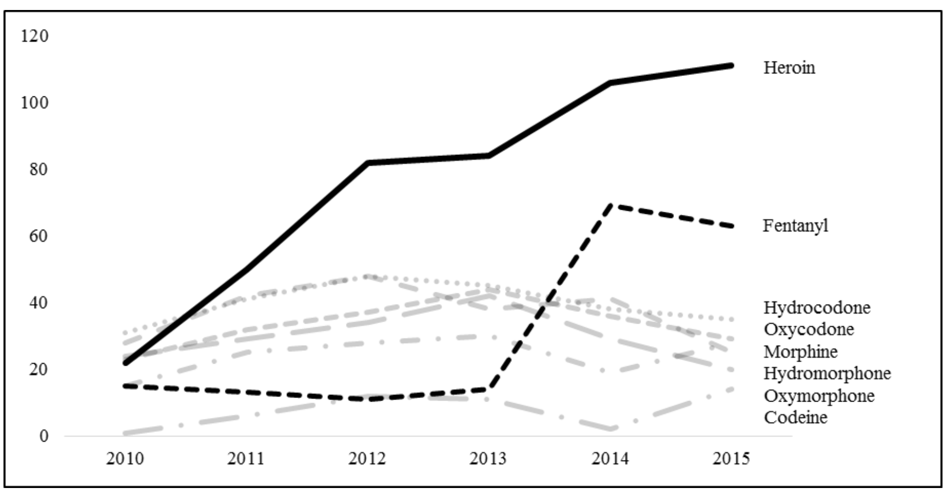
Table 2 displays the number of occurrences of all drug-related overdoses and overdoses related to each opioid, from 2010 through 2015, as well as the population adjusted rates and study period rate of change. During the six-year study period, the number of overall drug overdoses doubled from 129 to 260. The proportion of drug overdose deaths involving an opioid also increased during this period. In 2010, 63.6% of all accidental drug overdoses contained an opioid; by 2015 this increased to 80.8%. Nearly half (46.7%) of our opioid overdose deaths had more than one opioid substance detected in the toxicology report. The most common opioid detected during the study period was heroin (6-monoacetylmorphine) which was present in 49.6% (n=455) of the cases, followed by hydrocodone at 25.9% (n=238), hydromorphone at 24.2% (n=222), oxycodone at 21.9% (n=201), fentanyl at 20.2% (n=185), oxymorphone at 19.4% (n=178), morphine at 11.9% (n=109), and codeine at 1.1% (n=10).

**Table 2. Number and Rate of Accidental Drug Overdose Deaths by Opioid Substance in Marion County, Indiana, 2010-2015**

| | 2010 | | 2011 | | 2012 | | 2013 | | 2014 | | 2015 | | Rate of Change |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | Rate | N | Rate | N | Rate | N | Rate | N | Rate | N | Rate | 2010-2015 |
| All Drug Overdoses | 129 | 14.3 | 154 | 16.9 | 186 | 20.2 | 227 | 24.5 | 243 | 26.0 | 260 | 27.7 | 20.3 |
| Any Opioid | 82 | 9.1 | 111 | 12.2 | 146 | 15.9 | 165 | 17.8 | 204 | 21.8 | 210 | 22.4 | 31.2 |
| Heroin | 22 | 2.4 | 50 | 5.5 | 82 | 8.9 | 84 | 9.0 | 106 | 11.3 | 111 | 11.8 | 80.9 |
| Morphine | 15 | 1.7 | 19 | 2.1 | 18 | 2.0 | 21 | 2.3 | 18 | 1.9 | 18 | 1.9 | 4.0 |
| Codeine | 1 | 0.1 | 0 | 0.0 | 2 | 0.2 | 2 | 0.2 | 1 | 0.1 | 4 | 0.4 | 60.0 |
| Fentanyl | 15 | 1.7 | 13 | 1.4 | 11 | 1.2 | 14 | 1.5 | 69 | 7.4 | 63 | 6.7 | 64.0 |
| Oxycodone | 23 | 2.5 | 32 | 3.5 | 37 | 4.0 | 44 | 4.7 | 36 | 3.9 | 29 | 3.1 | 5.2 |
| Hydrocodone | 31 | 3.4 | 41 | 4.5 | 48 | 5.2 | 45 | 4.8 | 38 | 4.1 | 35 | 3.7 | 2.6 |
| Oxymorphone | 24 | 2.7 | 29 | 3.2 | 34 | 3.7 | 42 | 4.5 | 29 | 3.1 | 20 | 2.1 | -3.3 |
| Hydromorphone | 28 | 3.1 | 42 | 4.6 | 48 | 5.2 | 38 | 4.1 | 41 | 4.4 | 25 | 2.7 | -2.1 |

Notes: Categories are not mutuallyexclusive. Rate is per 100,000 residents.

**Figure 1. Trends in Opioid-Related Deaths by Substance in Marion County, Indiana, 2010-2015**




**Note: Rates of change for heroin and fentanyl were statistically significant during the time period and are highlighted above.**

The far right column of Table 2 displays the rate of change over the study period for each opioid and shows study period increases in all of the substances except oxymorphone and hydromorphone. The opioids with the highest rate of annual change were heroin and fentanyl with an 80.9% and 64.0% increase, respectively. The number of cases with heroin increased from 22 in 2010 to 111 in 2015, while fentanyl increased from 15 in 2010 to 63 in 2015. These two substances largely contributed to the 31.2% annual increase in the number of opioid-related deaths, which increased from 82 deaths in 2010 to 210 deaths in 2015. Figure 1 illustrates the trends among all the substances in light gray but highlights heroin and fentanyl, which had the largest rates of change over the study period.

**Prescription Data**

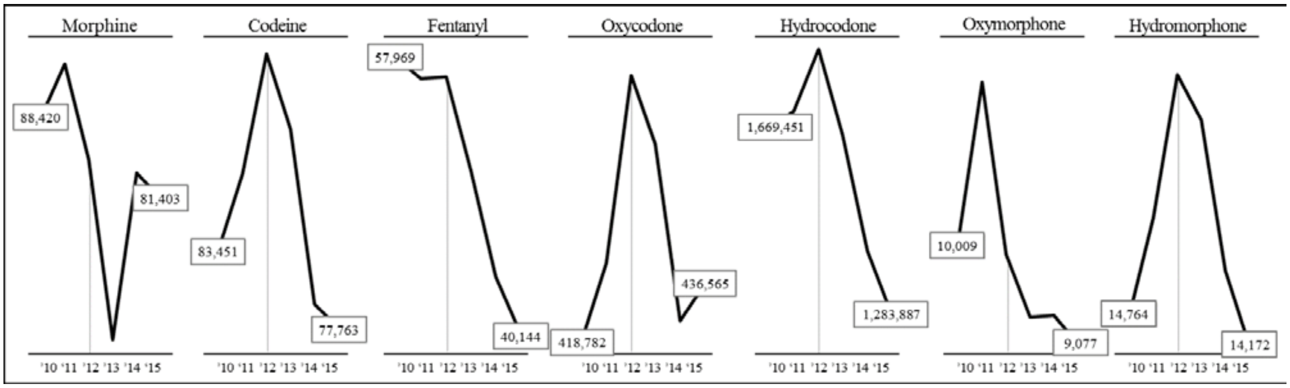
In order to examine what might be driving changes in overdose patterns, we next turn to county-level data from INSPECT. For these data we examined seven of the same substances from the toxicology reports which included morphine, codeine, fentanyl, oxycodone, hydrocodone, oxymorphone, and hydromorphone. Table 3 shows the number of prescriptions dispensed by substance. At an average of over 1.5 million prescriptions per year, the most frequently prescribed opiate in Indiana was hydrocodone. In 2010 it was the most common opioid found in toxicology reports, more than heroin and fentanyl combined, and during the entire study period, it was detected in 238 overdose deaths. The next most commonly prescribed opiate was oxycodone, which averaged 450,312 prescriptions per year. It is worth noting that while the number of oxycodone prescriptions were less than a third of hydrocodone, the difference in deaths associated with oxycodone did not feature this difference. Following oxycodone, the next highest average opiate prescriptions were morphine (86,743), codeine (83,404), fentanyl (51,001), hydromorphone (16,503), and oxymorphone (9,885). As shown in Table 3, with the exception of oxycodone, all of the prescription opiates have reductions in the number of prescriptions dispensed over the six-year period.

**Table 3. Prescriptions Dispensed by Opiate Substance in Marion County, Indiana, 2010-2015**

| *Prescription Opiate* | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | Rate of Change 2010-2015 |
|---|---|---|---|---|---|---|---|
| Morphine | 83,451 | 89,187 | 97,979 | 92,471 | 79,609 | 77,763 | -1.5 |
| Codeine | 88,420 | 93,016 | 84,765 | 69,196 | 83,626 | 81,403 | -1.7 |
| Fentanyl | 57,969 | 56,596 | 56,707 | 50,663 | 43,928 | 40,144 | -8.9 |
| Oxycodone | 418,782 | 442,842 | 499,663 | 478,774 | 425,247 | 436,565 | 0.8 |
| Hydrocodone | 1,669,451 | 1,704,825 | 1,833,542 | 1,653,940 | 1,414,155 | 1,283,887 | -6.0 |
| Oxymorphone | 10,009 | 11,577 | 9,942 | 9,342 | 9,360 | 9,077 | -2.1 |
| Hydromorphone | 14,764 | 16,628 | 19,353 | 18,487 | 15,614 | 14,172 | -0.8 |

Figure 2 uses the values from Table 3 to display trends in the number of prescriptions for each of the opiates. In order to illustratively compare the substances, the numbers are relative to each substance; however, what Figure 2 shows is that nearly all of the substances had decreases following a peak in prescriptions. For each substance there is a vertical gray line showing the year 2012. Four of the seven substances—hydromorphone, morphine, oxycodone, and hydrocodone—saw large increases from 2010 through 2012. For example, hydromorphone had a 31.1% increase from 2010 to 2012, followed by oxycodone with a 19.3% increase, morphine with a 17.4% increase, and hydrocodone with a 9.8% increase. The remaining substances—codeine, fentanyl, and oxymorphone—all had only moderate decreases during this time. However, all seven of the substances had decreases in prescriptions from 2012 to 2013; codeine decreased by 18.4%, fentanyl by 10.7%, hydrocodone by 9.8%, oxymorphone by 6.0%, morphine by 5.6%, hydromorphone by 4.5%, and oxycodone by 4.2%. With the exception of codeine (which has 20.9% increase from 2013 to 2014) and oxymorphone (which only increased by 0.2%) all of the substances had even more dramatic decreases from 2013 to 2014.

**Figure 2. Trends in Opiate Prescriptions in Marion County, Indiana, 2010-2015**




**Law Enforcement Data**

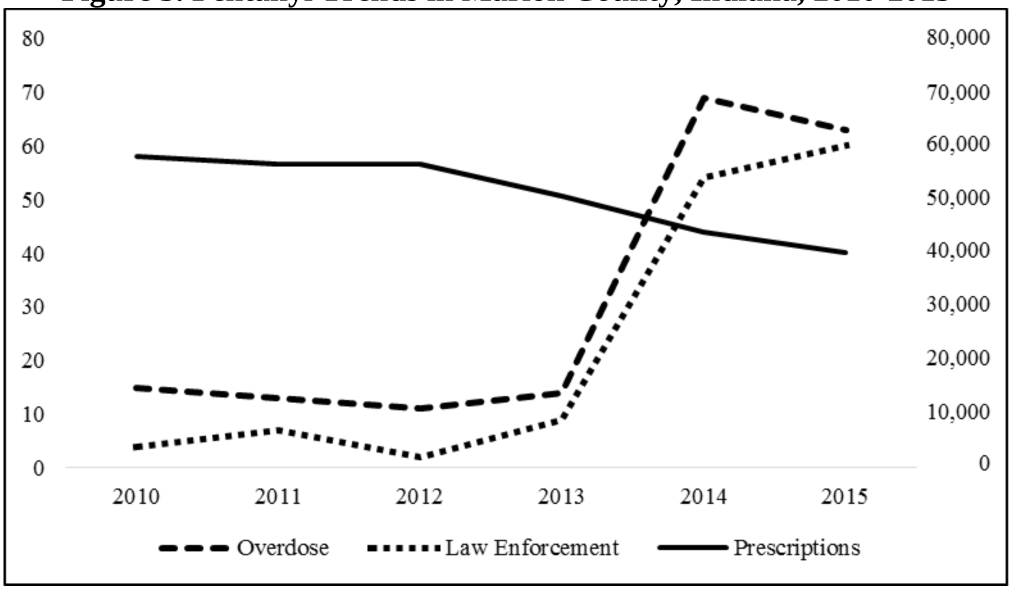
The final source of data we examined came from the MCFSA's (Marion County Forensic Services Agency) screening of drug evidence from all public safety agencies in Marion County. Again we looked at the same opioid substances analyzed in the coroner and INSPECT data, in the same county, over the same six-year time period. There were 9,122 positive screens for these eight opioids (6-monoacetylmorphine, morphine, codeine, oxycodone, hydrocodone, oxymorphone, hydromorphone, or fentanyl). At 5,209 detections, the substance detected most often during the six-year period was heroin; however, as shown in Table 4, this was partially due to a large annual increase during the period as heroin detections increased threefold from 452 in 2010 to 1,520 in 2015. Moreover, while heroin consistently had the highest number of detections among these substances, in 2010 heroin detections were only slightly above hydrocodone (452 and 429 respectively), though as heroin has increased, hydrocodone has decreased from 429 detections in 2010 to 235 in 2015.

**Table 4. Law Enforcement Detections of Opioid Substances in Marion County, Indiana, 2010-2015**

| *Opioid Substance* | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | Rate of Change 2010-2015 |
|---|---|---|---|---|---|---|---|
| Heroin | 452 | 526 | 764 | 1,056 | 891 | 1,520 | 47.3 |
| Morphine | 54 | 36 | 68 | 46 | 21 | 42 | -4.4 |
| Codeine | 13 | 14 | 14 | 16 | 9 | 14 | 1.5 |
| Fentanyl | 4 | 7 | 2 | 9 | 54 | 60 | 280.0 |
| Oxycodone | 143 | 183 | 248 | 269 | 207 | 347 | 28.5 |
| Hydrocodone | 429 | 392 | 401 | 298 | 201 | 235 | -9.0 |
| Oxymorphone | 2 | 4 | 4 | 18 | 8 | 4 | 20.0 |
| Hydromorphone | 8 | 4 | 11 | 11 | 0 | 3 | -12.5 |

Table 4 shows the highest annual increase was in fentanyl, with an average of 6 detections from 2010 through 2013 increasing to 54 in 2014 and 60 in 2015. The timing of the fentanyl increases in MCFSA detections are consistent with overdose patterns which show an average of 13.3 deaths from 2010 through 2013 and a sharp increase to 69 deaths in 2014 and 63 deaths in 2015 (see Table 2). Figure 3 shows trends with fentanyl among all three data sources in this study. Overdose and law enforcement data followed a similar trend, detecting more fentanyl which is represented by values on the left Y-axis; however, these increases corresponded to *decreases* in prescription fentanyl over this same time period which are represented by values on the right Y-axis. That is, as prescriptions of fentanyl began to decrease in 2012 and 2013 there were increases in overdose deaths and law enforcement detections of the fentanyl.

**Figure 3. Fentanyl Trends in Marion County, Indiana, 2010-2015**




**Note: Left Y-axis represents overdose and law enforcement counts and right Y-axis represents prescription counts.**

## Discussion

This study examined death certificate and toxicology data from 2010 through 2015 that were collected in collaboration with the coroner's office. We examined trends in these data and then used prescription drug monitoring and forensic data from local police in an attempt to better understand these trends. Consistent with national trends, we found increases in the overall number of drug-related death and that these increases were largely driven by opioids.[4] Using data collected from toxicology reports, we were able to examine the specific opioid-related substances detected in these deaths. Heroin and fentanyl were the substances with the highest annual increases in accidental overdose fatalities during the study period. In 2010, Marion County drug overdose deaths were more likely to include prescription opiates; however, by 2015 the number of deaths related to heroin were nearly equivalent to the number of deaths related to all these substances combined. Consistent with the literature on drug and opioid-related overdoses, we found that polydrug intoxication was common.[24-26] Unfortunately, we were unable to collect data on all licit and illicit substances that might interact with opioids for this study; notably missing are benzodiazepines, a substance that is often found in conjunction with opioids in overdoses.[27, 28] Given space limitations we did not include a full analysis of polydrug interactions though generally speaking we found a higher degree of polydrug presence among the prescription opiates that illicit opioids; however, in looking at the presence of a singular opioid, we found that these substances, in particular heroin and fentanyl, were those most commonly found alone.

In order to help explain trends in opioid-related deaths, we turned to prescription drug monitoring data and forensic data collected from law enforcement. Looking at INSPECT data over time we found consistent decreases in prescription opiates from 2010 to 2015 with a notable decline following 2012; fentanyl was the substance with the greatest decline. In examining the MCFSA data we found a pattern in heroin and fentanyl that closely mirrored the coroner's toxicology data. Specifically, we found rates of heroin detection more than tripled; fentanyl, which was only present in 4 cases in 2010, increased to 60 detections by 2015. Unfortunately, given the aggregated nature of these datasets, beyond this we were unable to observe and determine an association with deaths.

In interpreting these results, some limitations should be kept in mind. This study was constrained by our reliance on multiple sources of administrative data. With the coroner's data we were limited in the years for which electronic death certificates were available as well as the substances that we could reliably code for over this period. INSPECT, data are highly protected, and only after considerable efforts were we able to obtain data on specific substances. Even then the data were presented only prescriptions (not dispensations) at aggregated levels and with no identifiable or demographic information. Future research should consider addressing these protective barriers and focus on ways to examine more detailed INSPECT data and how to link these data other individual-level data. For example, with more detailed data on the prescription—such as the date of the prescription and dispensation as well as the number of pills and milligrams—we could more precisely examine when policy changes took effect and how these had an impact on prescribing behaviors. MCFSA data are also only aggregated and are not linked to demographics and case characteristics. Moreover, individuals can be charged with illicit opioid possession and/or distribution for very small to very large amounts, so the presence of these substances does not indicate the actual amount of illicit opioids available. Therefore, these forensic data might be a more accurate reflection of law enforcement patterns than illicit drug market activity. Also all of the data are limited over time (2010 to 2015) and geographically (Marion County, Indiana). It is likely that deaths of Marion County residents occurred in other counties and that prescription and illicit drugs associated with deaths were procured outside of the county. Yet, in spite of these limitations, this study offers important insight into opioid overdoses. Specifically, our findings are consistent with a growing body of research suggesting that while increased regulation of prescription opiates can reduce the likelihood of these substances to be present in overdoses,[29-31] it also results in nonmedical prescription opiate users—those using prescription opiates, without a prescription, for the purposes of experiencing or feeling the effects of the drug—turning to illicit opioids.[32-35]

## Conclusion and Policy Recommendations

A post-hoc analysis of the three data sets suggests a trend in Marion County that is consistent with recent analysis of drug use patterns; as prescription opiates become unavailable, users are turning to illicit opioids.33-35 The dramatic increase in prescription opiates during the 1990s and 2000s is well documented and is generally attributed to greater social acceptance, diversification in what these drugs are used for, and marketing activities of pharmaceutical companies.[36, 37] Our Table 3 shows the decline in prescriptions for codeine and oxymorphone is evident as of 2012 whereas the decline in prescriptions for all other opioids is not present until 2013. The timing of the reduction in prescription opiates in Indiana is likely due to two pieces of legislation—Senate Enrolled Act 246 and House Enrolled Act 1465—both of which were introduced in January 2013 and signed into law in April 2013.[38, 39] Senate Enrolled Act 246 was aimed at shutting down “pill mills” by requiring that clinics apply to the Indiana Controlled Substances Registration which would grant them permission to prescribe scheduled substances. The second piece of legislation, House Enrolled Act 1465, provided funding for INSPECT that allowed prescribers, dispensers, and law enforcement to access prescribing history but also set forth new protocols and standards for prescribing controlled substances. For example, physicians prescribing for chronic pain were required to obtain, review, and document records from prior providers; use validated screening tools; and follow prescribing thresholds. The Medical Licensing Board of Indiana adopted these rules in 2013. Moreover, this legislation also established the “Bitter Pill” initiative and website which focused on educating the public about the dangers of abusing prescription drugs and how to report illegal activities. In short, the INSPECT data analyzed in this study suggests that these legislative efforts were successful in reducing the number of controlled substances prescribed. In addition to legislation there were other factors that likely contributed to declines in illicit prescription drugs in Indiana. For example, there were several high-profile, multi-site, high-volume Indiana “pill mills” that were shut down by the Drug Enforcement Administration (DEA) as well as nationwide “take-back” initiatives began in 2010 as part of the Secure and Responsible Drug Disposal Act of 2010.[40-42] Thus the combination of DEA shutdowns of Indiana pill mills, nationwide take back initiatives as a result of the 2010 Secure and Responsible Drug Disposal Act of 2010 and the aforementioned pieces of 2013 legislation likely all contributed to declines in access to at least initially licitly obtained opiates.

Indiana’s prescription drug monitoring regulation may have had an iatrogenic effect on users and thus rates of fatal overdose from heroin and fentanyl. However, deregulation of prescription opiates is certainly not a solution to overdose and evidence suggests that increased law enforcement efforts are not likely have a major impact either. In fact, more aggressive policing policies have been show to increase rates of incarceration and thereby the risk of overdose.[43-45] The clear policy recommendation for Indiana is to expand treatment: Indiana has only 14 Opioid Treatment Programs (OTPs); in comparison, neighboring Midwest states such as Illinois have 71 OTP facilities, Ohio has 21, and Michigan has 34.[46] The low number is partially the result of a 2008 moratorium on approving new OTPs which has resulted in many users having to wait or be denied services.[47] The lack of treatment options in Indiana has not only resulted in increased rates of death but also infectious diseases. In 2015 Indiana made national headlines when an HIV outbreak was reported in Scott County with the majority of infections linked to needle sharing for the purposes of injecting prescription opioids.[48] Prior to this outbreak, neighboring states adopted syringe exchange programs while Indiana maintained a ban.[49] In short, INSPECT has been effective in reducing the distribution of nonmedical prescription drugs and, based on this study, might also have had a moderate impact on the rate of fatal overdoses associated with these substances. However, policies regarding the availability and funding of evidence-based treatments have lagged behind and likely play a role in the rates of overdose found in this study and others which suggest nonmedical prescription drug use and overdose in Indiana are higher than national rates.[4, 50]

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